

Rocky Mountain Geographic Science Center

Colorado Front Range Stand Delineation and Fuels Mapping

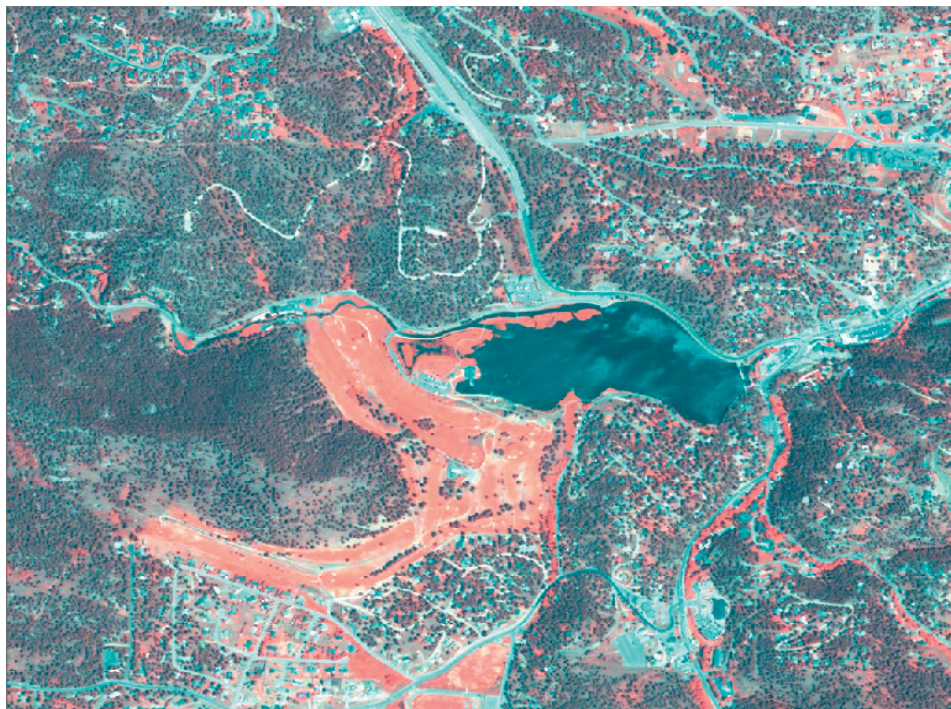
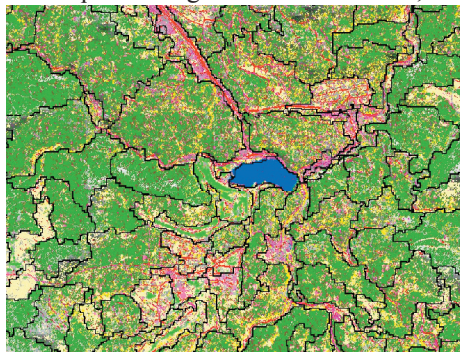
Fire Fuels Mapping

As wildfires continue to put pressure on planning and mitigation efforts at federal, state and local levels, the ability to map fire fuels and associated risks at the local level become increasingly important. In many areas, the increasing population in the Wildland-Urban Interface (WUI) adds to this complexity.



The Front Range Fire Fuels Mapping project has focused on the development of advanced digital mapping methodologies to support fire fuels mapping and associated risks. The fusion of advanced image classification techniques with high-resolution satellite data provides cost-effective and accurate inventories of fire fuels and associated risks in the WUI.

Traditionally, this type of vegetation delineation is available on a limited basis on Forest Service lands using traditional aerial photography interpretation techniques. Using automated methods,



similar information is made available throughout the Front Range – creating more consistent fuels information for land managers and fire response teams. The fire fuels classification will be used by the USGS, in collaboration with the impacted communities, local fire departments, state and federal officials to conduct a natural hazards risk assessment of the project area.

The USGS will then apply an integrated science approach to examine all potential natural hazards expected to impact the area, and consider the spatial and temporal aspects of a hazard and the potential for interaction among hazards. Specific to the wildland fire hazard: fuel loadings, impacts and effectiveness of fuel treatments, pre-event long-term climatic conditions and rainfall regime, and potential resources at risk will be evaluated. This integrated assessment of hazards will allow the USGS to work with

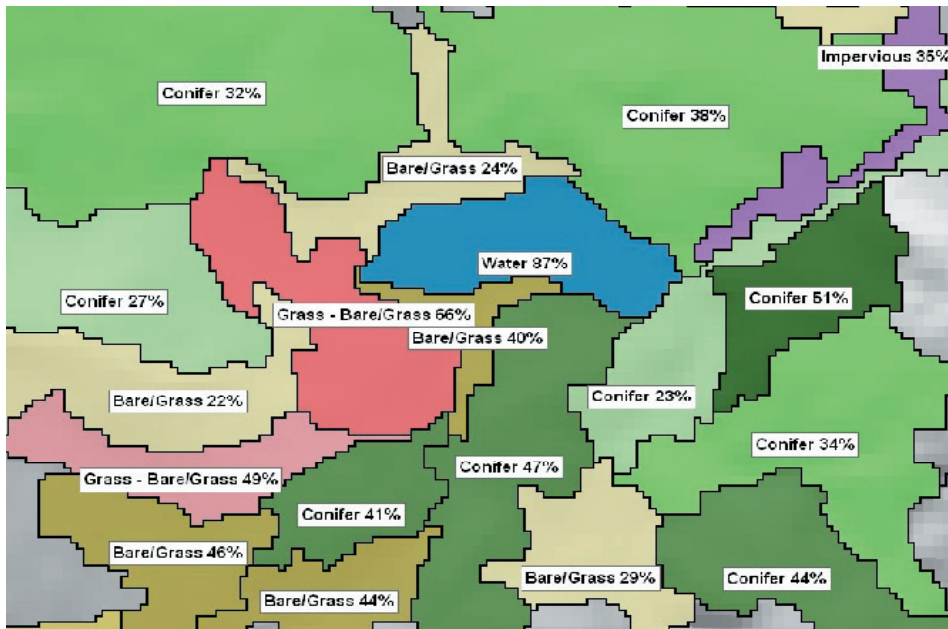
fire managers to prioritize fuel treatments, develop criteria for incident response and determine effective post-fire rehabilitation treatments.

Common Vegetation Polygons

In order to delineate areas of common vegetation from a fire fuels standpoint LANDSAT data was pan-sharpened using the 15-meter panchromatic band. The 15-meter image was segmented in eCognition into small image objects (polygons). These image objects were classified and aggregated into larger objects. The polygons were evaluated against existing USFS Common Vegetation Units (CVU), fire fuels models, and land cover classifications to determine whether they identified the areas of interest for fire fuels and assets-at-risk analyses.

Image Classification and Density Calculations

Once the Common Vegetation Polygons were delineated, the next step was to perform a high-resolution land cover classification. Pan-sharpened QuickBird imagery, with a spatial resolution of 0.7-meters, an NDVI index, elevation, and aspect data were used for the classification. The area was classified into general cover types – conifer, deciduous, impervious, grass, bare ground/grass, and water. Statistics were calculated for each common vegetation polygon including the dominant cover type, percent area covered by each cover type, and canopy closure.



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Existing land cover maps were evaluated in order to determine the utility of the Common Vegetation Polygons and to minimize the effort put into new land cover classifications. The BLM Colorado Vegetation Mapping Project, the SWReGAP, and USGS NLCD datasets were tested. The first determination was whether the Common Vegetation Polygons reflected the vegetation in the existing classifications. The next step is to ascertain whether the existing classifications are adequate for fire fuels and values-at-risk analyses necessary in the WUI along Colorado's Front Range.

